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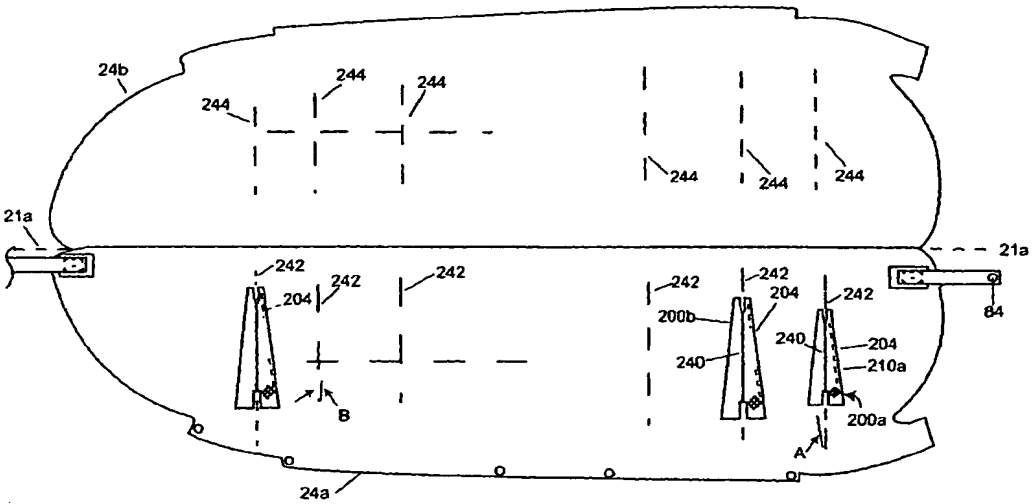

(57) Abstract: A side impact or rollover occupant restraint system (20) has an airbag (22) of sufficient length to extend from a first (30) pillar to at least a second pillar (34) of the vehicle. The airbag, upon inflation, is of sufficient height to extend from proximate a roof rail (38) of the vehicle to a location generally adjacent the shoulder of a 50th percentile sized seated vehicle occupant such that the inflated airbag will lie between the vehicle occupant and a side structure of the vehicle. The airbag includes first and second panels of material that are joined together to create at least one inflatable chamber (101a, b). A plurality of internal tethers or separators form bridges between predetermined regions of the first and second panels such that upon inflation of the airbag these regions are spaced from one another by a particular internal tether.

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VEHICLE OCCUPANT RESTRAINT SYSTEM

The present invention relates to an inflatable side curtain airbag that provides vehicle occupant protection to vehicle passengers during a side impact crash or rollover.

A side curtain airbag module is mounted proximate the vehicle roof rail and is concealed by the headliner trim. In a crash the curtain, or airbag, deploys between the vehicle occupant and intruding object to protect the outboard front and rear vehicle occupants. The present invention defines one or more inflatable chambers within the airbag and insures that the front and the rear panels of the airbag that form these chambers remain spaced apart to provide added protection for the vehicle occupant while keeping the chamber volume at an acceptable level.

To control the inflated shape and volume of an airbag it has been proposed to directly sew the front and rear panels together. This construction defines various chambers in the airbag (in which certain portions of the front and rear panels are spaced apart) but this construction also places other portions of the panels in direct contact, particularly at the separator sew lines. This reduced spacing reduces the "cushioned depth" between the vehicle occupant and a side of the vehicle. This is not the case with the present invention.

There is provided in accordance with the present invention a vehicle occupant restraint system of the type described in claim 1.

Brief Description of the Drawings

Fig. 1a is a side plan view of an inflated airbag with horizontal chamber separators.

Fig. 1b is a cross-sectional view of a gas distribution tube.

Fig. 1c shows a cross-section through section 1c-1c of Fig. 1a.

Fig. 1d shows another cross-section showing an alternate embodiment of the invention.

Fig. 1e shows an alternate tab construction for supporting a gas distribution tube.

Fig. 2 is a left-hand plan view of the interior of a passenger compartment showing the major components of the present invention.

Fig. 3 is a top view of an exemplary separator panel.

Fig. 4 is an isometric view of an axial flow airbag inflator.

Fig. 5 illustrates the interconnection of the inflator with other components of the invention.

Fig. 6 shows a side curtain or airbag in its deployed state protecting vehicle occupants within the passenger compartment.

Fig. 7 shows an alternate embodiment of the invention with vertical separator panels.

Fig. 8 is a cross-sectional view through section 8-8 of Fig. 7.

Figs. 9a-9c and 10 show alternate separator panels.

Fig. 11 is a plan view of the main panel of the airbag of Fig. 1.

Fig. 12 is a cross-sectional view through a folded-over main panel and shows a plurality of separator panels also in a folded-over configuration.

Fig. 13 shows a folded airbag mounted near a roof rail.

Fig. 14 is a plan view of an alternative airbag.

Fig. 15 shows the main panel of the airbag of Fig. 7 laid open with various separator panels being sewn thereto.

Fig. 16 shows how a separator panel is secured to the main panel of Fig. 15.

Fig. 17 shows another step in the construction of the airbag of Fig. 15.

Detailed Description of the Invention

Reference is now made to Figs. 1a-c, 2 and 6. Fig. 1a shows a side impact/rollover module generally indicated as 20. The module comprises an airbag 22 of sufficient length to extend generally across two or more pillars of the vehicle. As illustrated, the airbag extends from the vehicle's A-pillar 30 (Figs. 2 and 6) across the B-pillar 32 to the C-pillar 34. In many mini vans the airbag may extend only between two pillars or alternatively extend from the A-pillar to the D-pillar (Fig. 14). The airbag 22 is of sufficient height that when deployed (Fig. 6) the airbag 22 will lie between the roof rail 38 of the vehicle and the upper torso and/or shoulder of the outboard seated 50th percentile vehicle occupant 40a, 40b. When deployed the airbag will also lie against an internal side 36a, 36b of the vehicle.

The airbag 22 comprises a single main panel 21 (Figs. 1 and 11) that is folded about its centerline 21a. The folded-over portions of the main panel are referred to as a first or front 24a and a second or rear panel 24b. The airbag can be made of a plurality of separate panels of material that are joined together, along a centerline or otherwise, as opposed to using a folded-over main panel. In the preferred embodiment of the invention, the main panel is a woven material such as nylon that is coated on one side to control air permeability. A low permeability, uncoated fabric may also be used. The airbag can also be made of a thermoplastic material that is welded or bonded. With regard to the fabric, airbag material permeability and/or its coating are chosen to match the required time the airbag should be inflated. The

airbag 22 is formed by sewing the remaining three sides, after it is folded over centerline 21a, of the airbag together to form an inflatable cushion after various sets of separator panels 200a-c are attached to the panels 24a, 24b (Figs. 11 and 15).

The top 26 of the airbag 22 shown in Fig. 1a is formed using a seam 28, which joins panels 24a, 24b together. The sides of the panels are joined by one or more seams 28a, 28b. Located above the seam 28 are a plurality of mounting features such as tabs 39 that may be formed integrally with the panels. As shown, each tab 39 has an opening 40. The openings can also be located directly in the selvage on the top side of the seam 28 (Fig. 1a); in this case the tab would not be necessary. The tabs 39 or just the openings 40 are useful to connect the airbag to a roof rail 38 of the vehicle. A plurality of fasteners, not shown, are used to secure the top 26 of the airbag to the roof rail.

The airbag includes an opening 44 integrally formed by the panels 24a, 24b. In Fig. 1a the opening is located toward the rear end 42a of airbag 22 but it can be located anywhere else in the airbag, preferably near the roof rail or a pillar to facilitate mounting. An airbag inflator 60 is inserted in the opening 44 (Figs. 4 and 5). The inflator includes a plurality of mounting brackets or flanges 62a, 62b to permit the inflator to be mounted to an adjacent structural component such as the C-pillar of the vehicle or at a designated location along the roof rail. The inflator 60 may be a solid propellant, hybrid, augmented or liquid inflator of known variety, which upon activation produces or supplies pressurized inflation gas to the airbag 22. The inflator 60 includes a

plurality of output ports 64 (Fig. 4) or a gas diverter housing (not shown) to direct the inflation gas into the airbag. Located within the top portion 26 of the airbag 22 is a flexible tube 70. The tube has an elastomeric inner tube or core 71 with a reinforced outer sheath made of a braided or woven fabric 73, as shown in FIG. 1b. Alternatively, the tube can be made of metal, plastic, rubber or nylon. The tube 70 has a plurality of openings 72. The tube 70 has a pair of ends 74a, 74b. As shown in Fig. 5, one end 74a is secured about the inflator 60, by a bracket or clamp 62b, to permit the inflation gasses to flow directly into the tube. The opposite end 74b of the tube can be left open or closed or bonded shut, as appropriate, to properly distribute gas through the airbag. The inflator 60 can be mounted to one end 74b, which would require that the other end 74a be similarly arranged. In addition, upon activation of the inflator 60, inflation gasses pass through the tube 70.

Because of the length of the tube 70, the pressure distribution of the inflation gasses will diminish in relation to the distance from inflator 60. Consequently, the openings 72 in the tube may be non-uniformly distributed along the tube or may be of differing sizes such that the entire volume of the airbag 22 is inflated relatively simultaneously. For example, the distribution of openings 72 can be biased toward the closed end 74b of the tube, that is, the side of the airbag 22 distal from the inflator 60. The tube 70 can extend across substantially the entire top of the airbag or terminate 74c at the entrance of the front chamber 101a. In this case the end of the tube 70 would be left open.

It is not necessary to inflate the airbag 22 to its maximum volume, as various regions of the inflated airbag are not located near a seated vehicle occupant. Consequently, various regions of the airbag 22 are closed off from receiving inflation gas. The size and placement of these regions will vary with the particular vehicle and seating arrangement. By reducing the inflated volume of the airbag, it is possible to use a smaller capacity inflator. In FIG. 1a the center of the airbag 22a lies near the seat back 300, or alternatively near the B-pillar 32, and is bonded or sewn shut 23a so that it will not be inflated. If the airbag 22 were inflated in this location 22a, it would not provide any appreciable vehicle occupant protection in most crashes. The corners of the airbag can usually be sewn shut. For example, the lower rear and lower front regions 22b, 22c can be bonded or sewn together by sew lines 23b, 23c such that they do not inflate. Various lower, upper and side structures of the airbag can be similarly restricted, for example at sew lines 23d-23g.

The lower regions of the airbag 22 may be reinforced with additional small patches 25 of material to reinforce the connection of an external tether 80. One end of the tether 82a is bonded or sewn to a section 22c of the airbag while another end 84 of tether 80 is loosely or pivotally secured via a fastener which is received through opening 85 to a structural portion of the vehicle. The sewn ends of the tether can be with the airbag or external thereto. Similarly, the forward portion 22b of the airbag 22 is secured to a second tether 80a. One end 84a of tether 80a is secured proximate the lower portion of the A-

pillar 30 and moves downwardly upon deployment of the airbag 22.

In FIG.s 1a and 1c the airbag 22 is divided into two inflatable regions, chambers or cushions 101a, 101b. Each of these cushions includes a plurality of separators 200a-c (also called separator panels or bridges) that join generally opposing regions of the front panel 24a and the rear panel 24b together. FIG. 1c shows the airbag 22 inflated, lying against an interior side 36a of the vehicle. The separators 200a-c are of the same width, providing the inflatable chambers of the airbag with a generally rectangular cross-section. Seams 204 join each of the separators 200a-c to the panel 24a, while the sewn seams 206 join the separators to the other panel 24b.

Fig. 1d shows a further embodiment of the invention wherein tabs 39 are formed as thin strips (with holes 40 at its ends). These strips are formed into a U-shape to cradle the tube 70. The tabs, in the U-shape and with the tube within the "U" of the strap, are placed upon one of the panels 24a of the airbag. The other panel 24b is overlaid on the tabs 39 and the panels 24a, 24b and the tabs are secured together at the upper seam 28. In this embodiment, the tabs function as a means for mounting the airbag and a support means for the tube. The tabs 39 do not need to be integrated into the panels 24a, 24b but can be made from fabric straps. The separator panels are arranged to lie generally horizontally, but can be disposed at an angle as indicated by letters A and B.

Fig. 3 is a plan view of an exemplary separator panel 200a. The separator, or separator panel, has sides 210a, 210b that are sewn to a corresponding airbag panel 24a, 24b. The ends 212a, 212b of the

separator panel include slots 214. The interior end 216 of each slot or notch 214 is curved. The slot and curved internal profile provide stress relief in the various seams 204, 206 and prevent the separator panels 200a-c from detaching from the panels 24a, 24b. When the airbag 22 is inflated, the various panels 24a, 24b tend to be forcefully pulled apart as indicated by arrows 218 and resist further inflation of the cushions 101a, 101b. Each slot 214 permits the separated legs 220 of each end 212a, 212b to move outwardly, thereby relieving the stress that would otherwise be created at the sewn seams 204, 206. The separator panels are made of woven material arranged at a bias (45° ± 5°) to the airbag panels 24a, 24b. The separator or separator panels 200a additionally include an opening or slot 222. The opening is preferably oval in shape. The opening 222 and the two opposing slots 214 permit the inflation gas to be distributed quickly throughout the inflatable cushion portions 101a, 101b of the airbag.

As shown in Fig. 1a, it is not necessary that the length of the separators 200a-c be identical and the lengths are chosen to provide maximum protection for a vehicle occupant. For example, one separator 200c within the cushion portion 101a is shorter than its corresponding separator 200c in the cushion portion 101a. Additionally, it may be desirable to tailor the width of any particular separator panel so that the inflated shape of the airbag, and in particular the cushions 101a, 101b, is controlled. Fig. 1d shows the use of three separator panels 200a-200c, with each separator panel having a different width.

The airbag 22 of Fig. 7 also includes inflatable cushion portions 101a, 101b, however, the separator

panels 200a, 200b, 200c are arranged substantially vertical. These panels can also be configured to lie at an angle relative to vertical rather than along the vertical. For generality the front cushion portion 101a is shown as including two separator panels 200a, 200b, while the rear cushion portion 101b includes three separator panels. The panels can be of varying sizes as shown. Each of the separator panels is also joined to a respective airbag panel 24a, 24b by a sew line 204 or sewn seam 206. Fig. 7 also shows each separator panel laid flat between the airbag panels 24a, 24b and sewn thereto. The sewn seams 204, 206 securing each separator panel to a respective panel are not aligned, but laterally spaced. Fig. 8 is a cross section through line 8-8 of Fig. 7 and shows the relationship of the separator panels 200a, 200b, 200c when the airbag is inflated. The separator panels of Fig. 7 are generally rectangular.

Figs. 9a-c are plan views of exemplary separator panels 200a-c used in the airbag of Fig. 7. The various separator panels, such as 200a, include slots 214 at their ends (the panel in Fig. 9b only has one slot). Each panel may optionally include an opening 222 (shown in phantom line). The sides 210a, 210b may be parallel as illustrated in Fig. 3 or angled as shown in Fig. 9a, partially tapered as shown in Fig. 9b and 9c or arcuately shaped as shown in Fig. 10.

Fig. 11 shows the main panel 21 for the airbag of Fig. 1 laid flat upon a work surface. The centerline 21a is also visible. Also illustrated in Fig. 11 are each of the two sets of three separator panels 200a, 200b, 200c for each of the cushion portions 101a, 101b. One of benefits of using the relatively horizontally oriented separator panels is the ease of

manufacture. Each side 210a of each separator panel 200a-c is laid on one of the airbag panels, such as 24a, and placed in the desired location, which is identified by pre-printed markers or lines 230 and 230a-c. Each separator panel is then sewn along its side 210a to the airbag panel 24a. The sew lines 204 for each separator panel 200a-c are also shown. After the separator panels are secured along one of their sides to the main panel, they are then secured to the other side, such as panel 24b. Panel 24b includes markers or lines identified by numerals 230a-c showing the preferred location of each seam 206 (or side 210b)', which secures the other side 210b of each separator panel to panel 24b of the airbag 22. As the main panel 21 is flexible, panel 24a can be folded and moved as the lower separators 200c are moved toward their preferred sewn location 230a on panel 24b. Arrows 232 are meant to show the movement of panel 24a and in particular separators 200a to the location denoted by the line 230a. With side 210b of each separator 200a moved in alignment or correspondence with line 230a, the lower separators 200a are sewn to panel 24b along side 210b. Subsequently, panel 24a and in particular the middle separator panels 200b are moved further over onto panel 24b such that sides 210b of these middle separator panels are in alignment with lines 230b, whereupon the middle separator panels are sewn to panel 24b.

The above process is continued until side 210b of each of the upper separator panels 200c is sewn along lines 230c. Upon sewing the upper separator panels 200c to panel 24b of airbag 24, panel 24a is positioned on top of panel 24b. With the panels 24a, 24b in this orientation, the top and sides of the

airbag are secured together along peripheral seams 28, 28a 28b. In addition, the non-inflated regions 22a, 22b, 22c, etc. are created by a plurality of additional sewn seams to achieve the configuration as shown in Fig. 1a.

The tethers 80, 80a can be sewn to the main panel before it is folded over or sewn to the airbag after it is folded over and, if needed, additional patches of airbag material are placed in the vicinity of the sewing connection of the tethers 80a, 80b to further reinforce the airbag. In one construction, the tube 70 is inserted through opening 44 in the airbag and positioned against seam 28 (at the top of the bag) and the inflator 60 attached thereto. As mentioned above in relation to Fig. 1e, the tube 70 and the tabs 39 can be placed on panel 24a of the main panel while it is open, tacked in place and panel 24b sewn to panel 24a.

Subsequently, the airbag is folded into a long, compact, cylindrical configuration, as shown in Figs. 2 and 13. An additional benefit of the horizontal tethers is that the various folds in the airbag can be arranged such that the various seams 204, 206 of each of these separator panels do not lie on top of each other, thereby permitting the airbag to be folded in a compact configuration (Fig. 13).

Fig. 14 shows an alternate embodiment of the airbag. This airbag is adapted to extend from the A to the D pillar 34a to provide protection for vehicle occupants in the front, middle and rear seats of a minivan. This airbag 250 is substantially similar to airbag 22 of Fig. 1a in relationship to the inflatable cushions 101a, 101b and the various separator panels 200a-c. The airbag 250 extends rearward of cushion

portion 101b and includes a second non-inflatable area 252 followed by an inflatable cushion portion 101c having two separator panels 200a, 200b. The opening 44, which was placed in the rear of airbag 22, is configured somewhat differently in airbag 250. The airbag 250 is configured to include a second opening 44a positioned adjacent opening 44. The inflator 60 is communicated to both openings 44, 44a through a hollow, T connection or fitting. The above-mentioned flexible hose 70 extends from opening 44 toward the front of the panel and terminates at the rear of cushion portion 101a. It is not necessary to use a tube such as 70a to distribute inflation gas into rearmost cushion 101c. For the purpose of illustration, tube 70a has been shown.

To fold the airbag into the configuration of Fig. 2, the lower edge of the airbag 22 is folded upwardly such as into an accordion or other pleat configuration 90 to achieve the configuration generally shown in Fig. 13. In this configuration, the airbag 22 of Fig. 1 will essentially be formed into a long, cylindrical-like configuration. To keep the airbag in this rolled configuration, the airbag is enveloped in a tearable cover 92 such as sewn fabric, polyurethane with tear seam or snap-together (and openable) semi-hard plastic cover. The folded, enveloped airbag 22 is then secured to the roof rail 38 using a plurality of retainer clips, such as 100a, 100b (Fig. 2).

As illustrated in Fig. 13, one of the retainer clips, such as 100b, includes a pre-stressed tear or snap-together region 102 to permit each clip to open (FIG. 6) upon inflation of the airbag 22. The retainer clips 100a, 100b can be secured with fasteners 110. Fig. 13 shows one such fastener 110

securing clip 100b to the roof rail. The fastener 110 can also be used to secure a hand grasp 112, which is often located adjacent the roof rail.

The manufacture of an airbag 22 with relatively vertically arranged separators is shown in Fig. 7. Reference is first made to Fig. 9a, which illustrates a typical separator used in this airbag. Each separator has printed thereon a reference line 240 that extends through the center of the separator panel, such as 200a. Fig. 15 shows a main panel 21 laid open on work or sewing table with panels 24a, 24b laid flat relative to the centerline 21a. Prior to attaching any of the separator panels, the airbag panels 24a, 24b are imprinted with a plurality of reference lines 242, 244, which identify the location of the center of each separator panel 200a-200c. A first separator panel is placed on one of the airbag panels, such as 24a, with its center reference line 240 aligned with its corresponding reference line 242.

Having aligned the two reference lines 242, 240 (on the separator panel), the operator ensures that the separator panel is laid flat and then sews the separator panel along a first sew line 204, which extends along side 210a of the separator panel. Thereafter, a second separator panel is positioned upon its reference line and sewn to the airbag panel 24a. This process is continued (from left to right or right to left) until each separator panel is sewn to the airbag panel along only one side of the separator panel. Thereafter, panel 24b is folded over the centerline of the main panel 21 and registered and aligned with panel 24a. The folded-over panels 24a,b are flipped over such that panel 24b lies against the work surface.

Fig. 16 shows the seam 204 used to join one of the separator panels to airbag panel 24a. The separator panel 200a and the airbag panel 24 are shown lifted from panel 24b for the purpose of illustration, it being recognized that these panels will lie flat one on the other. Prior to sewing side 210d of the first separator panel to airbag panel 24b, the center reference line 240 is aligned to the reference line 244 previously imprinted on panel 24d. To facilitate this alignment, the operator will roll over a portion of the airbag panel 24a, exposing the separator panel 200a. Thereafter, the operator ensures that the separator panel 200a lies flat on airbag panel 24 and sews the panels together along a seam 206.

Fig. 17 shows a separator panel 200a secured to airbag panels 24a, 24b. Using the method described with reference to Fig. 16, the operator will repeat the steps described above to secure separator panel 200b to panel 24b. As before, the reference line 240 of this separator panel is aligned to reference line 244 in airbag panel 24. A portion of panel 24a is folded over to expose side 210b of separator panel 200b. The operator ensures that separator panel 200b lies flat against panel 24b with their reference lines aligned and sews the panels together along seam 206. This process is continued until each of the separator panels is secured. Thereafter, the perimeter seams are sewn in the airbag, the external tethers attached and the various non-inflation zones established, thereby completing the construction of this airbag.

CLAIMS:

1. A vehicle occupant restraint system (20) comprising:

an airbag of sufficient length to extend from a first (30) pillar to at least a second pillar (34) of the vehicle, the airbag (22), upon inflation, is of sufficient height to extend from proximate a roof rail (38) of the vehicle to a location generally adjacent the shoulder of a 50th percentile sized seated vehicle occupant such that the inflated airbag will lie between the vehicle occupant and a side structure of the vehicle;

the airbag including first and second panels (24a, 24b) of material that are joined together to create at least one inflatable volume (101a,c) and a plurality of internal tether or separators for forming corresponding bridges between predetermined regions of each of the first and second panel such that upon inflation of the airbag these regions are spaced from one another by a particular internal tether.

2. The vehicle occupant restraint system (20) defined in Claim 1 wherein the internal tethers or separators are disposed generally horizontally.

3. The vehicle occupant restraint system (20) defined in Claim 1 wherein the internal tethers or separators are disposed generally vertically.

4. The vehicle occupant restraint system (20) defined in Claim 1 wherein the airbag includes more

than one inflatable volume, wherein each volume includes corresponding internal tethers or separators.

5. The vehicle occupant restraint system (20) defined in Claim 1 wherein at least one internal tether includes stress-relieving means at corresponding ends thereon.

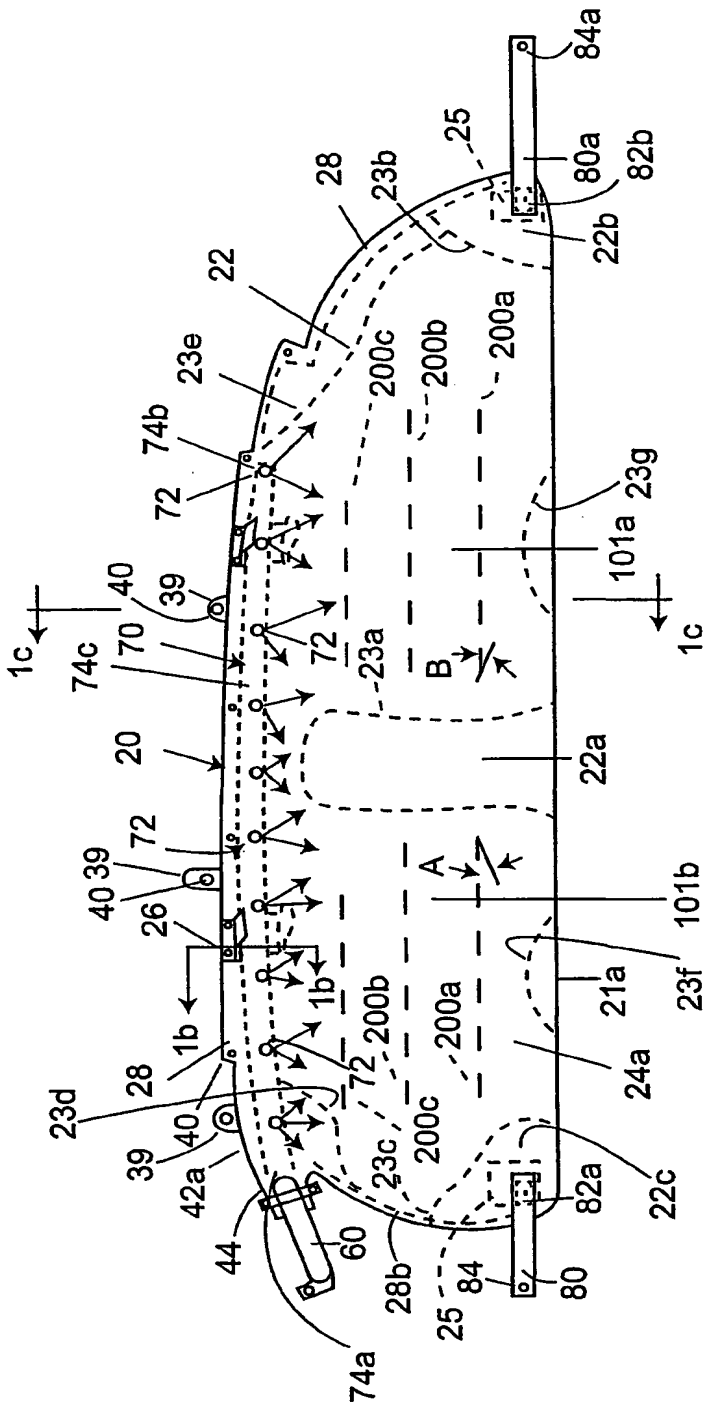
6. The vehicle occupant restraint system (20) defined in Claim 5 wherein the stress-relieving means includes a slot or notch formed in each end of the internal tether.

7. The system as defined in Claim 6 wherein the stress-relieving means includes forming the internal tether of woven material, wherein with warp and weft threads of the woven material run through the internal tether at a bias.

8. The vehicle occupant restraint system (20) defined in Claim 1 wherein at least one internal tether or separator includes an opening therein to allow inflation gas to flow thereacross.

9. The vehicle occupant restraint system (20) defined in Claim 8 wherein the opening is generally oval in shape.

10. The vehicle occupant restraint system (20) defined in Claim 1 wherein each internal tether or separator includes opposing sides, and wherein the opposing sides are one of: straight and parallel, straight and angles relative to one another, and arcuate.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74c
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B
1c
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22a
72
39
40
A
26
101b
1b
200b
200a
21a
23f
1b
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72
24a
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Fig. 1a

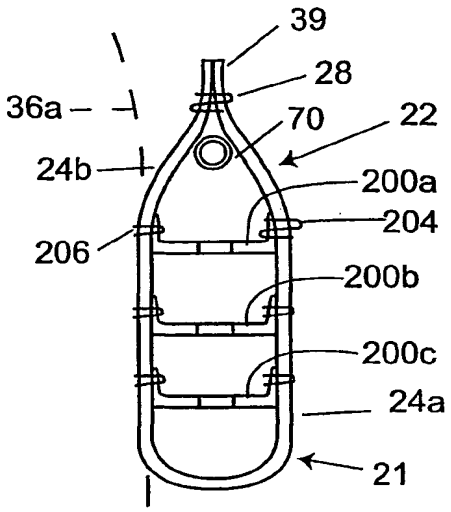


Fig. 1c

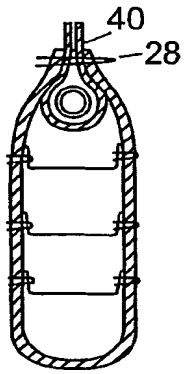


Fig. 1e

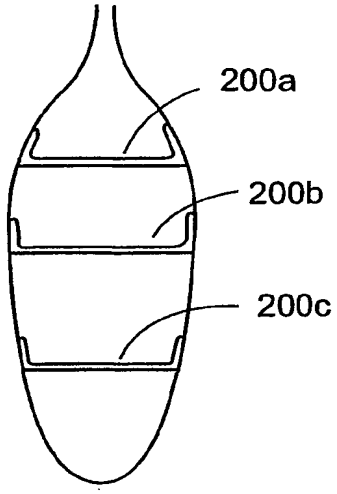


Fig. 1d

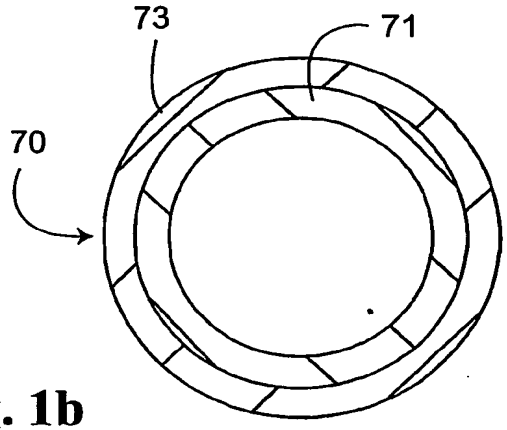


Fig. 1b

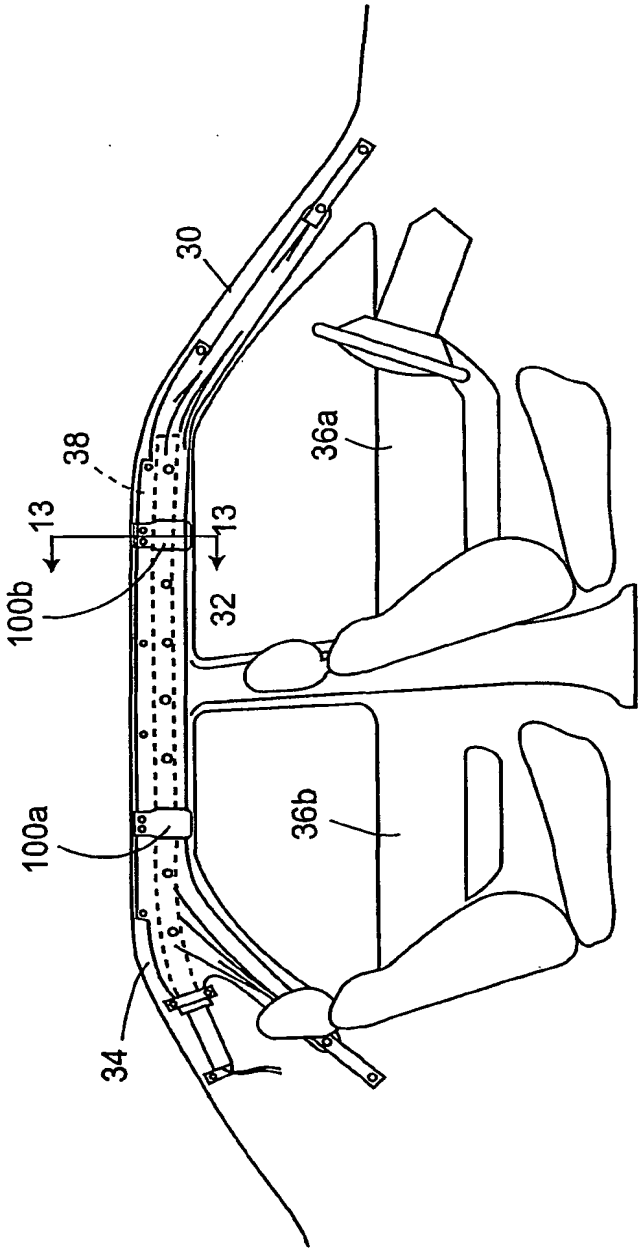


Fig. 2

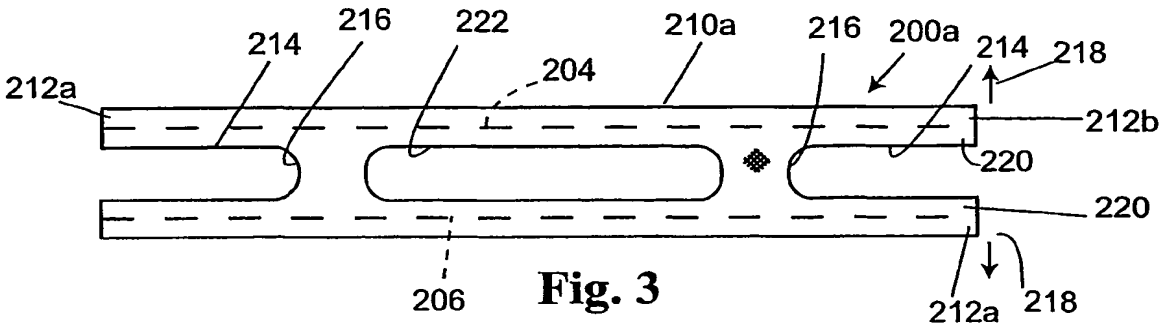


Fig. 3

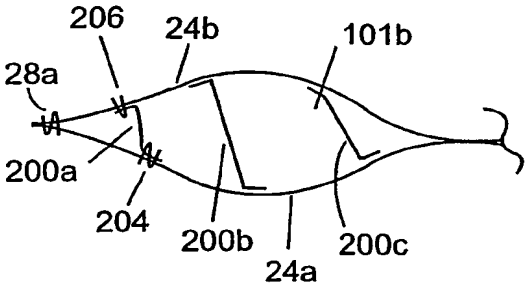


Fig. 8

Fig. 10

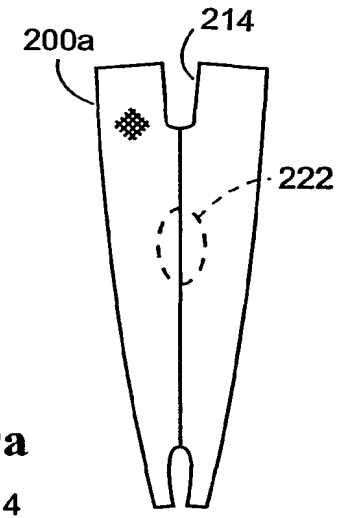


Fig. 9c

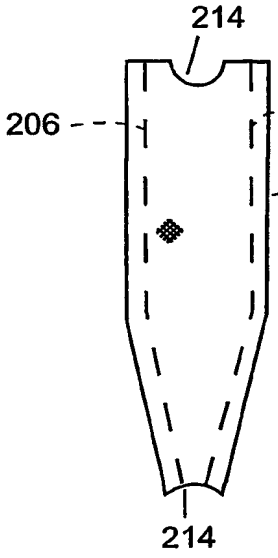


Fig. 9b

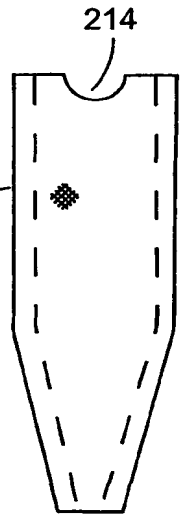
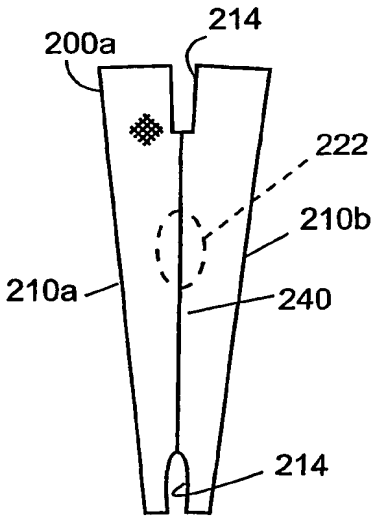


Fig. 9a



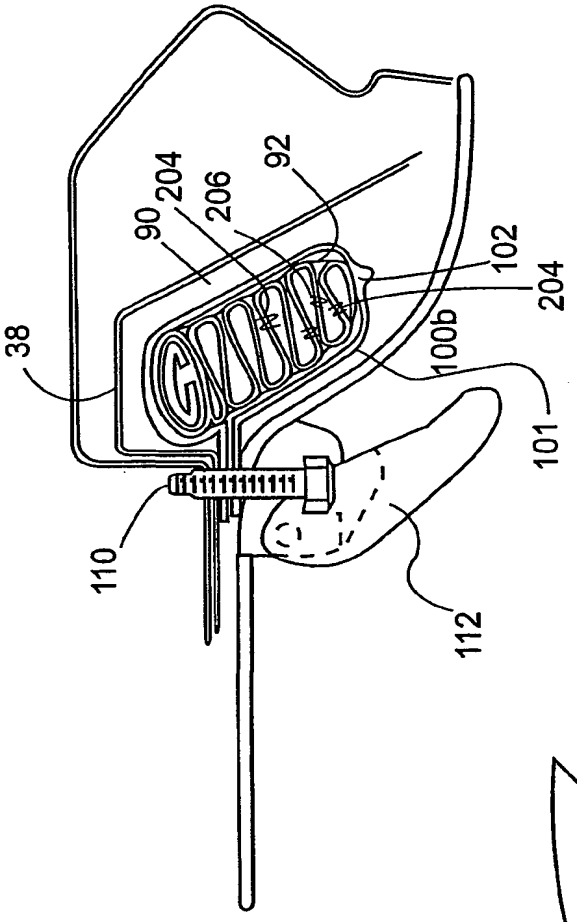


Fig. 13

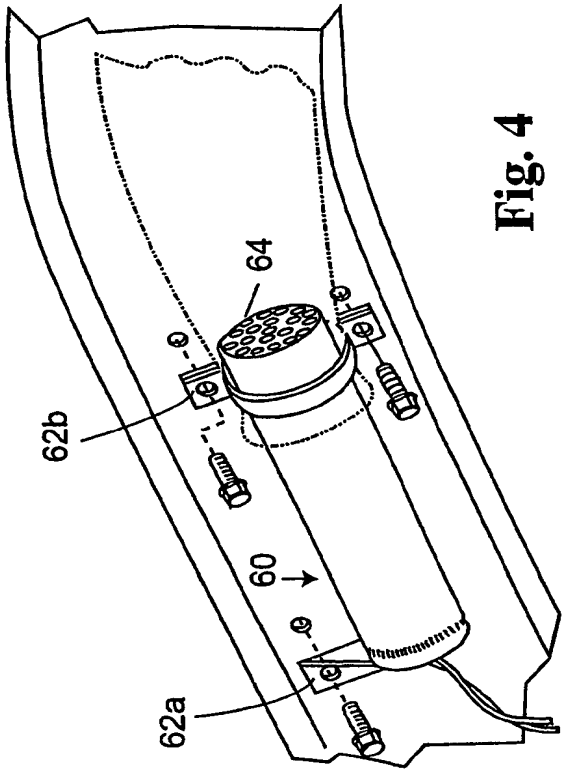


Fig. 4

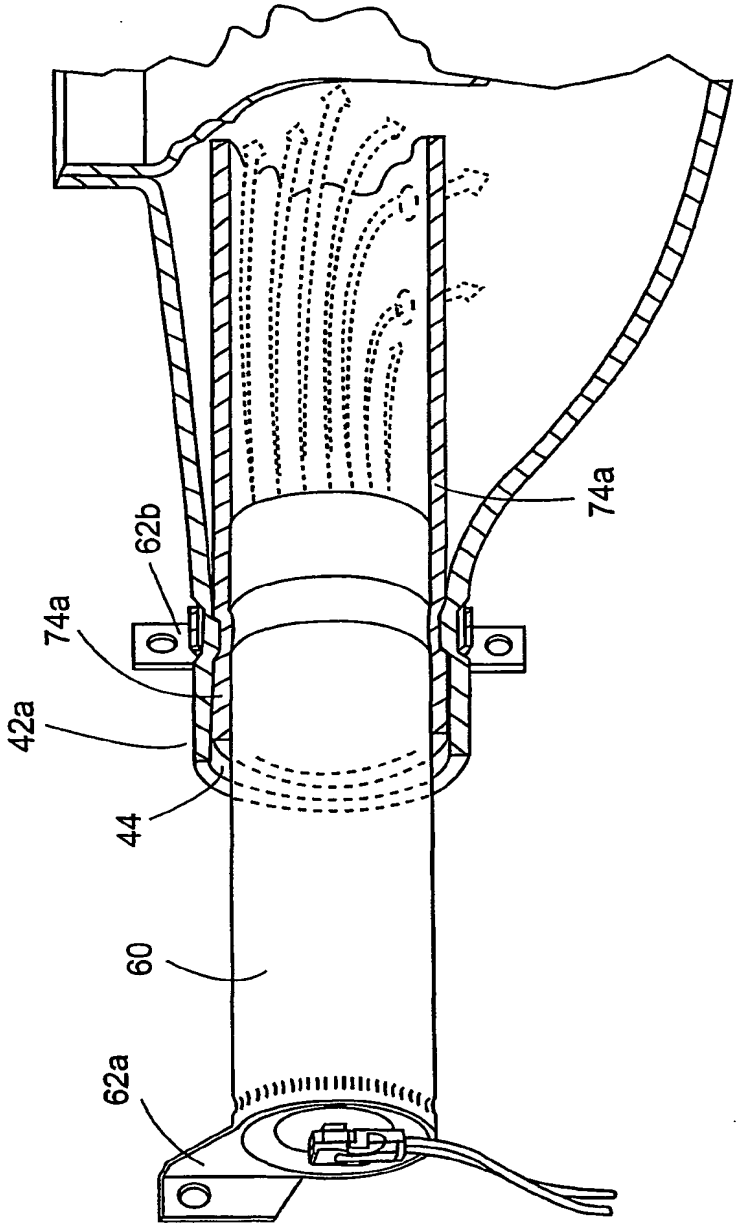
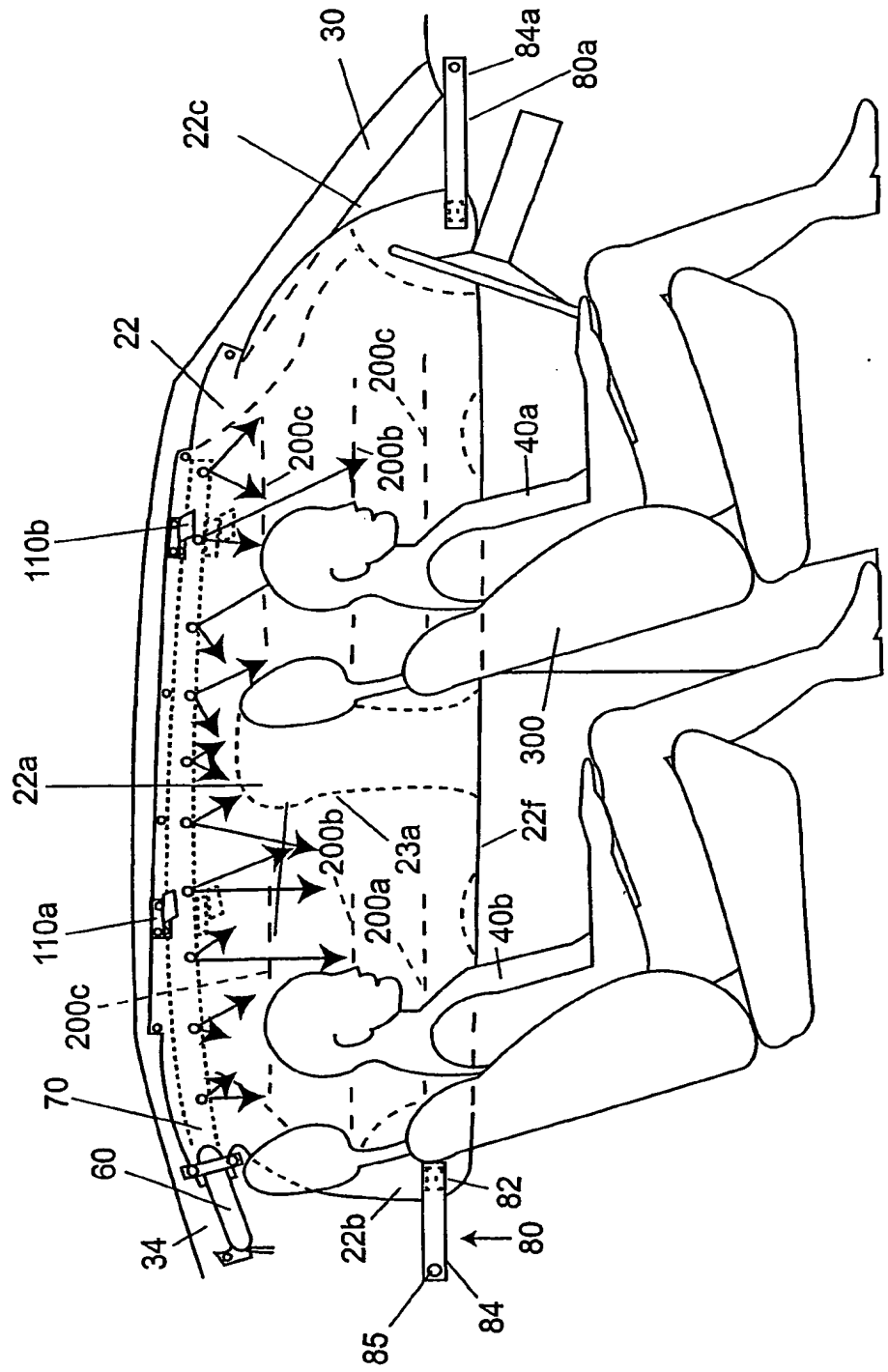


Fig. 5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22c
22
200c
200c
200b
40a
110b
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22a
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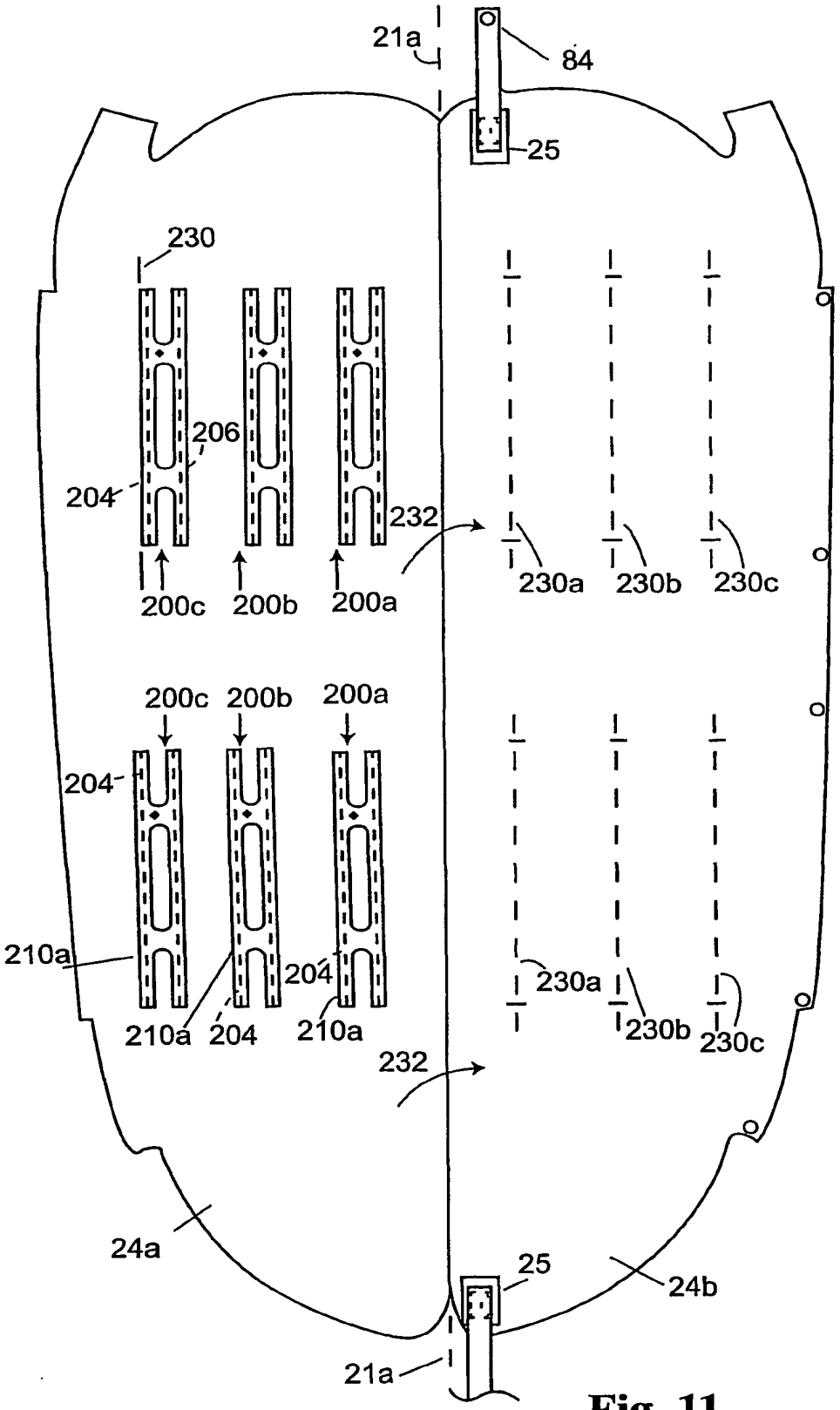
23a
22f
110a
200a
40b
200c
70
60
34
22b
82
80
84
85

Fig. 6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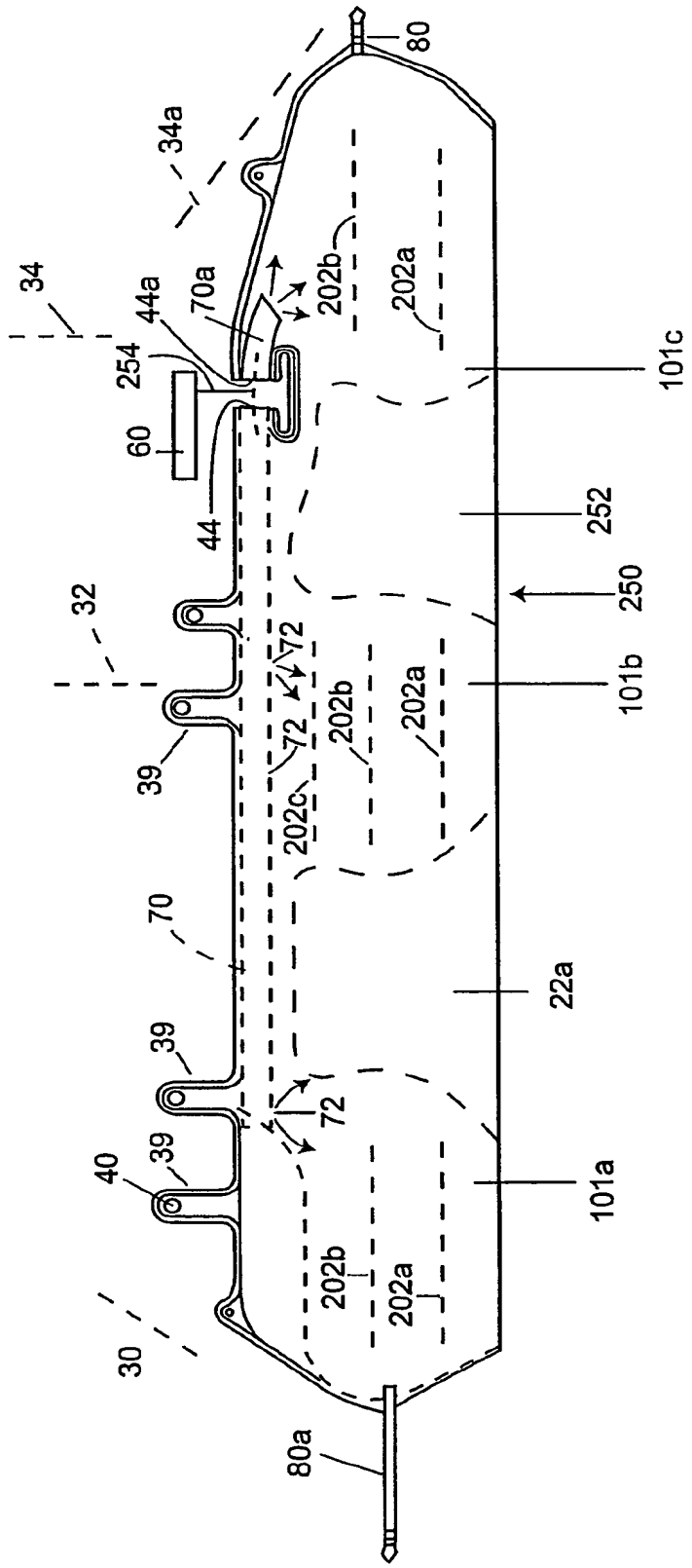
206
204
232
200c
200b
200a
230a
230b
230c
210a
24a
24b

Fig. 11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202b
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202c
70
22a
40
101a
30
80a

Fig. 14

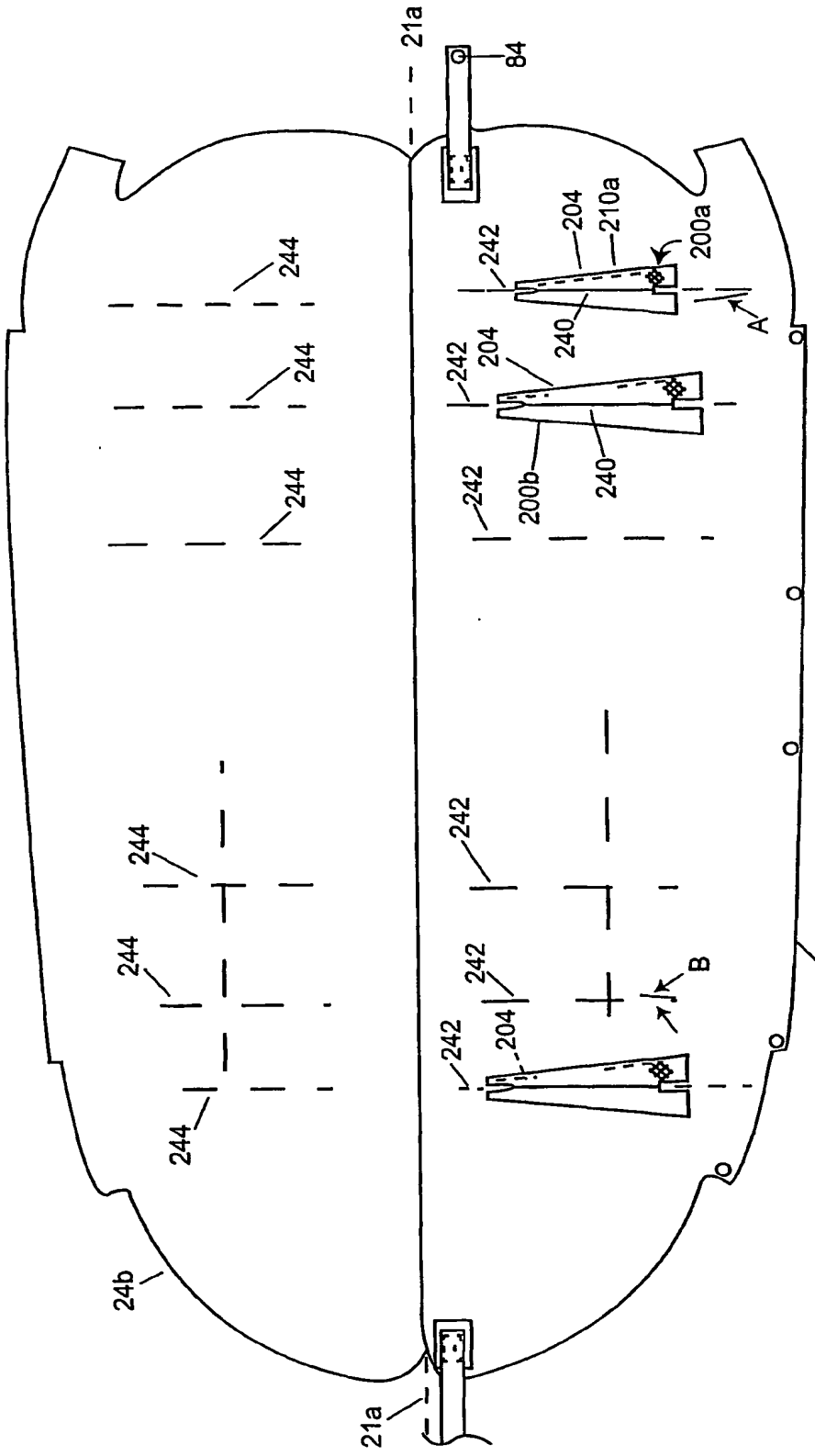

Fig. 15

INTERNATIONAL SEARCH REPORT

Ir onal Application No
PCT/US 01/12985

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 98 33682 A (BREED AUTOMOTIVE TECH) 6 August 1998 (1998-08-06)	9
A	abstract; figures 1-5 page 4, line 16 -page 5, line 9 page 6, line 1 -page 6, line 26	1,5,8,10
A	US 5 944 342 A (OLSON MARK O ET AL) 31 August 1999 (1999-08-31) abstract; figures 1-6,13-15 column 2, line 53 -column 2, line 65 column 5, line 54 -column 5, line 59 column 6, line 1 -column 6, line 21	7
X	DE 297 18 305 U (TRW REPA GMBH) 12 February 1998 (1998-02-12) claims 1,16; figures 2,7-9 page 7, line 17 -page 7, line 38	1,3,4,10

INTERNATIONAL SEARCH REPORT

Information on patent family members

In nal Application No
PCT/US 01/12985

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Vehicle occupant restraint system

Patent number: AU5375101
Publication date: 2002-01-08
Inventor: KALANDEK BRUCE A; WIPASURAMONTON PONGDET P; TOBIAN ROBERT
Applicant: BREED AUTOMOTIVE TECH
Classification:
- international: ***B60R21/16; B60R21/20;*** *B60R21/26;* **B60R21/16; B60R21/20;** B60R21/26; (IPC1-7): B60R21/16
- european: B60R21/16B2B; B60R21/16B2V; B60R21/20K
Application number: AU20010053751D 20010419
Priority number(s): US20000602266 20000623; WO2001US12985 20010419

Also published as:
WO0200476 (A1)
US6450529 (B1)

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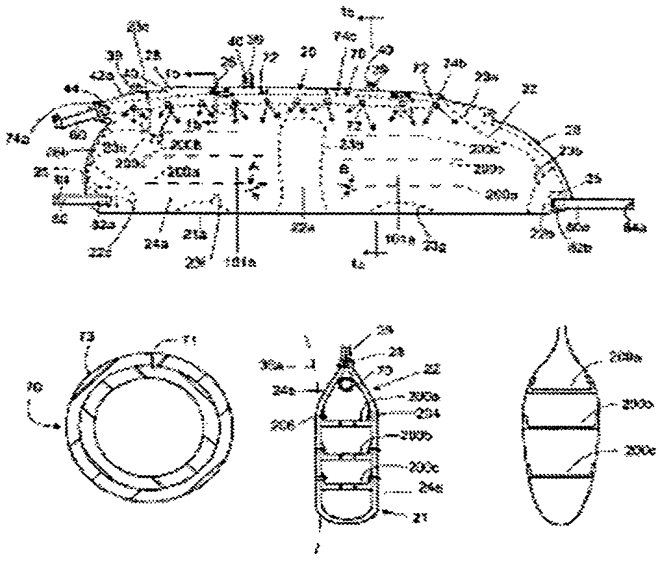
Abstract not available for AU5375101
Abstract of correspondent: **US6450529**

A side impact or rollover protection restraint system (20) comprising: an air bag of sufficient length to extend from a first (30) pillar to at least a second pillar (34) of the vehicle, the air bag (22), upon inflation, is of sufficient height to extend from proximate a roof rail (38) of the vehicle to a location generally adjacent the shoulder of a 50th percentile sized seated occupant such that the inflated air bag will lie between the occupant and a side portion of the vehicle; the air bag including a first and a second panel of material that are joined together to create at least one inflatable volume (101a,b) and a plurality of internal tethers or separators for forming corresponding bridges between predetermined regions of each of the first and second panel such that upon inflation of the air bag these regions are spaced from one another by an internal tether.



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